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Interactive comment on “Multiscale monsoon variability during the last two climatic cycles inferred from Chinese loess and speleothem records” by Y. Li et al.

Anonymous Referee #2

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I recommend this manuscript publication in the Journal of Climate of the Past for three reasons. Firstly, a general pattern of the grain-size data fits well into the insolation and ice-volume forcing, which provides a basis for refining chronology of the loess profile as the author did in the manuscript. Secondly, by decomposing the loess grain-size and speleothem delta O-18 time series, the authors found one-to-one correlation of millennial-scale events between the two records, This finding is merit to understanding mechanisms of rapid climate changes in the past glacial-interglacial cycles, particular to studies of low-latitude monsoon dynamics and its global linkage. Lastly, the authors calculated the relative contributions of external and internal forcing to the east Asian summer and winter monsoon changes on orbital and millennial scales, which helps

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to explain quite different patterns of orbital changes recorded by Chinese loess and speleothem archives. In general, the manuscript is well expressed in the points they addressed. Thus, the manuscript of good quality is worth of publication in *Climate of the Past*. However, I raise many important questions as below should be considered in the final decision for publication. (1) Grain-size data have been widely used as a proxy for changes in winter monsoon strength in paleoclimatic studies of the Chinese Loess Plateau. A lot of sections of grain-size data with high-resolution and sufficient time length have been published, including cited and non-cited in the manuscript. A comparison with other grain-size data from high sedimentation rate and weak pedogenesis loess-paleosol sequences in this region is useful to test local or regional significance of the Gulang section. In particular, the authors should check if the millennial-scale events shown in Fig.6 could be validated in other loess sections? I suggest drawing a figure to show the nature of replication within the dating uncertainty. (2). The composite speleothem data appeared in Fig.2 are problematic. The data sourced from the two references (Wang et al, 2008, Cheng et al, 2009) unlikely produce this figure. I guess that the authors subjectively selected other cave data (for example, a set of the penultimate glacial data published in Cheng et al, *Geology*, 2006) to replace some intervals of the cited data in the last two climate cycles. Please give an explanation for this replacement. (3). A total of 25 D/O events in the NGRIP ice records during the last glacial period are also seen in the Chinese speleothem records (Wang et al, 2008). However, I could not find additional 3 DO events (numbered from 26 to 28 in Fig.6) in the raw speleothem records. I suspect that the decomposing approach would produce illusive/noise signal such as the DO 26-28. (4) The variances of 11 and 16% are too precise to be accepted due to more or less noise added to the climatic signal in the loess and speleothem records. The noise arises from either analytical errors or differences in amplitude of millennial-scale events between the same archives. For example, Fig. 2 shows many differences at millennial-scale changes from the data published in *Nature* (Wang et al, 2008). (5) The author should give more detailed explanation for the tie-points in Fig.2. We know that the SPECMAP age model shows 3-5

thousand years younger than the speleothem records at the last three ice terminations. (6) I wonder why Li et al have not described stratigraphy of the Gulang section (depth, loess-paleosol units) ? If published elsewhere, please cite it. It seems that parts of the data used in this manuscript have been already published in Catena (2011). However, I do not see the cited reference. (7) In the cited references, Sun et al (2012) published in Nature Geoscience, NOT nature.

Interactive comment on Clim. Past Discuss., 10, 4623, 2014.

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